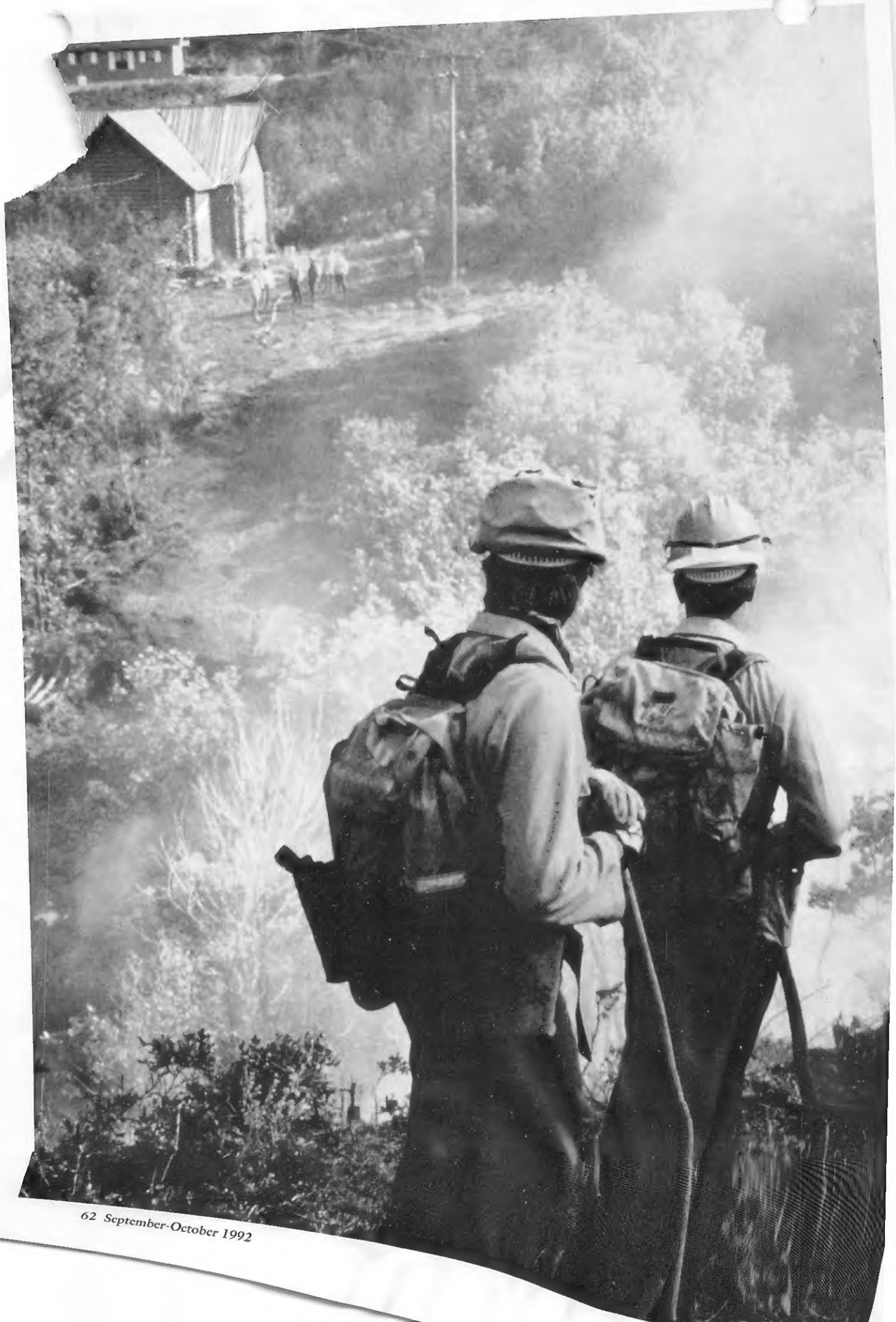

the job ... provided a benchmark to evaluate performance. We now have the ability to evaluate alternative methods of construction based on consistent standards.

With the ability to identify jobs and to plan and schedule them for the best utilization of our construction crews and equipment, we focused on work ready for release to construction from engineering. Engineers kept their own job files and were the only ones who knew what they were working on. This resulted in customer frustration and an inability to control work. In order to rectify this situation, we decided to develop a work management system for engineering.

We identified the basic jobs and with help from our engineers were able to design underground and overhead planning sheets. This allowed the engineers to evaluate new jobs for additional engineering tasks beyond those necessary for the basic job. A set of standard times was developed for these basic jobs and engineering tasks and all work was moved to a central filing system.

A control board similar to the one in construction was designed and installed in the engineering division. Since the city was divided into three sections, each engineer is responsible for specific areas. Therefore, it would have been awkward for all work to go into a common backlog section. We concluded that the engineers would have their own section on the control board. The sections would be divided into four classifications; backlog, new work, work in progress, and work on hold. The engineering supervisor would review incoming service requests and determine engineer assignments. After placing the service request in the new works section on the control board, the engineer would investigate the job and complete the planning sheets. This information is used to determine the amount of time it should take to engineer the customer's request and get it to construction.

We could now identify and advise customers of job progress by the planning sheet and what the engineer had approved. The control board displayed the status of all jobs to be engineered and the reasoning behind them. The last item that was added to the control board was a copy of the service request to be retained after the job had been sent to construction. When the work package returned to engineering with the as-built drawings, the construction changes would be evaluated, the drawings corrected if necessary, and the engineering copy removed from the control board.

Now that every job in the system could be identified by status in both engineering and construction, we could respond to customer inquiries better through automation of the work management system. However, this meant that all service requests needed to be logged into a database residing on a local area network. A tracking system was developed that would monitor job progress and identify significant milestones. Each time an employee logged on to the system and worked on a service request, we captured all modifications to the information for that job. The system also allows us to retrieve a job by customer name, address, service request number, date originated, or any part of these. We now can locate a job and respond to a customer inquiry in a matter of seconds, rather than minutes or hours.

In analyzing the data now available, it was apparent there were areas where crew utilization could be improved. One such area was material issues. The city of Garland has a main frame purchasing and inventory control system that has a materials reservation module. This system can indicate the availability of material in our warehouse and reserve material for a job. Data services, the electric department and our consultant launched a joint effort that merged the main frame to our PC local area network environment. Data entry for common information is accomplished once and accessed by both systems producing an estimate with materials automatically reserved for construction crews. This reduces our material outages allowing for better use of construction crews. The material can be reserved for any desired month or automatically reserved for the earliest possible date. A daily exception report details what changes have occurred.

Several projects are planned to interface with the city's central information system and our PC network to improve the responsiveness to our customers. These include:

- Integrating our graphics information system with the work management programs establishing an automatic extension for drawing the job.
- Developing a forecasting model that will anticipate customer needs on a macro level, enabling the utility to respond quickly.
- Developing an automated T&D scheduling system that is integrated with our customer service department.
- Developing an automated trouble call system that provides real time data for the systems operations, engineering, and administration divisions of the electric department.

Garland Power & Light is determined to provide the highest level of service and reliability to its customers. To accomplish this, resource use, employee development and technology have been integrated into a series of systems that give management information for effective operational decision making. As a result, TQM is business as usual at Garland Power & Light. PP

Roy Trotter is manager of administration and planning at Garland Power & Light.

Heber City's Lights

by Ray Farrell

A 1990 forest fire showed this Utah city the importance of owning your own.

In 1985, the market sent clear signals that Heber Light & Power needed to plan for its future electricity supply. Low land prices were attracting new residents to the Heber City area from Salt Lake City, 40 miles northwest, and from Provo, 30 miles southwest. The community was growing at 2 to 5 percent per year, area utilities were faced with building new capacity, and power costs were escalating.

Today, seven years later, planning has paid off for HL&P. Despite accelerated growth now approaching 8 percent annually, Heber City can look ahead to affordable, reliable power far into the next century. HL&P met its challenge by moving aggressively into the power generation business.

The utility's gas- and diesel-fueled generator sets provide two major benefits:

- Lower rates. The generators contribute to a pool of capacity maintained by a group of Utah municipal utilities for load management during peak-demand periods.

In return for having the capacity on hand, HL&P receives significant rate credits.

- Emergency power. The generators provide enough reliable standby capacity to serve all HL&P customers during utility power outages.

HL&P serves the communities of Heber, Midway and Charleston, comprising 3,800 residential and 650 industrial and commercial customers. Typical peak demands are seven MW in summer and eight MW in winter, the latter driven by residential heating and extensive use of electric engine-block heaters on automobiles.

The utility's primary power sources include:

- Two hydroelectric plants owned by HL&P, providing two MW of capacity, mainly during summer.
- The Western Area Power Administration, a federal power agency, providing 3.4 MW of capacity in winter and 2.7 MW in summer.
- A 3.4-MW ownership in the Hunter No. 2 coal-fired plant, located in Emery County, Utah, and operated by PacifiCorp.
- A 10-MW interest in the Intermountain Power Plant at Delta, Utah.

This 1,600-MW coal-fired plant, operated by the Los Angeles Department of Water and Power, is owned by PacifiCorp, five cities in California and 23 municipal utilities in Utah.

Because HL&P most likely will not need power from the Intermountain plant until the year 2005, the utility has laid off its share to the California owners, retaining the right to recall it on six months notice.

As reassuring as these long-term contracts are, people in the mountains know the risks of relying completely on outside sources of electricity.

Winter storms often build up six to eight feet of snow in nearby mountain passes, and snow slides create an ever-present threat of widespread, long-lasting power outages. HL&P's generation capacity gives local residents insurance against such disasters, while also helping keep power costs down. In fact cost savings were the main reason Heber entered the gneration business. HL&P is a member of Utah Associated Municipal Power Systems, formed in 1980 by several municipal utilities to finance 50 MW of coal-fired generatig capacity.

The importance of stand-by power was demonstrated when a brush fire swept through Wasatch Mountain State Park.

Today, UAMPS has 37 members, and its activities include buying and selling power as far away as Colorado and Southern California. In addition, many UAMPS members own generating capacity that can be called upon during winter or summer peak-demand periods.

The availability of this 54-MW of capacity, called the Hot Ready Stand-by Pool, helps UAMPS secure low-cost power during peak hours bymaking nonfirm purchases on the spot market. UAMS reserves the right to call pool members' generating coacity into service at any time on 10 minutes' notice. In return, UAMPS pays each pool member a monthly credit of $5.25 per kW for its capacity, whether or not the generators are used. If the generator is started and brought on-line, UAMPS also pays an energy credit of 4 cents per kWh.

In recent years, the term "peak sharing" has been used to describe arrangements in which municipal utilities receive special rates or credits for installing capacity to help satisfy peak demands on larger utility systems.

HL&P joined the Hot Reay Stand-by Pool in 1988 after buying four used Caterpillar G399TA natural-gas-fired generator sets, providin 2.6 MW of capacity. Since then, in exchange for runnig the generators a total of about 100 hours per year, HL&P has received credits from UAMPS averaging $50,000 and has achieved a three-year payback on the quipment. The first generator installation was so sucessful that, in March 1990, HL&P began building a econd plant that ultimately will boost total engine/gerator capacity to 7.3 MW.

Payback through UAMPS credits is proje to five years. When finished in about 1996, MW plant will contain two natural-gas-firec G3516 generator sets, each rated at 760 k diesel 3516s, each rated at 1,600 kW. The f and the first diesel unit went on-line in late 1 generators are linked to HL&P's SCADA sys

All of Heber Light & Power's generators are linked to the utility's SCADA system.

can be started individually or as a group, either from Heber City or remotely by the UAMPS dispatcher in Sandy, Utah.

An HL&P operator is always on call, but no on-site personnel are needed to start the engines or bring them on line. The low labor requirement is a key to keeping the operation cost-effective.

Just as valuable as the savings is the self-sufficiency the generators provide. Combined, the engine/generators and hydro units eventually will give HL&P 9.3 MW of stand-by capacity, enough to handle the city's base load in most emergencies well past the year 2000. The importance of stand-by power was demonstrated dramatically on Sunday, Aug. 26, 1990, when a brush fire swept through Wasatch Mountain State Park, just southwest of Heber City.

The blaze killed two firefighters, destroyed 18 homes, and burned more than 3,000 acres of mountainside. It also knocked out a 46,000-volt utility line feeding the

city. The power went out at 4:20 p.m. By 6:50 p.m., HL&P employees were executing an emergency plan.

The generators, which have black start capability, were brought on line first, followed by the hydro units. By 7:50 p.m., those sources were supplying enough power to satisfy normal Sunday evening demand. Monday morning saw a brief spell of power rationing made necessary by the higher demand of a business day.

However, by noon, two portable one-MW generators loaned from Utah Power & Light were also on-line, and all HL&P customers had power. Without local capacity, the Heber City area would have suffered severe economic losses.

Among those most at risk were 15 large dairy farms, who needed power to milk their herds in the morning and evening each day. As it was, HL&P's generation equipment ran nearly five days, until utility power was restored at 2 p.m. Aug. 30. Today, as construction proceeds on the new 4.7 MW generating plant, HL&P is better prepared than ever for emergencies, and solidly positioned for the future.

The brush fire killed two firefighters, destroyed 18 homes and burned more than 3,000 acres of mountainside.

The increased capacity promises large rate credits under the UAMPS peak sharing program, and the combination of gas- and diesel-powered generators provides a great deal of flexibility. The gas-fired generators use fuel purchased at a low interruptible rate from Mountain Fuel Supply.

That rate is 0.32 cents per therm, 0.108 cents lower than the standard rate.

At the interruptible rate, the generators can produce energy at 3 cents per kWh, versus 5 cents at standard gas prices. An interruptible rate may appear risky, in that cutoffs most likely would occur during the coldest winter days, when electricity demand is also high and UAMPS could call up HL&P's capacity.

In practice, however, the risk is minimal. Mountain Fuel Supply has a record of reliability, having curtailed its interruptible customers only once in the past ears.

That happened during a week-long spell just before Christmas in 1990, when low temperatures reached -34 degrees and HL&P's generators were required to run. Even then, HL&P was prepared, as a 15,000-gallon supply of propane provided ample fuel to the four older G399TA engine/generators. The curtailment did lead to HL&P's decision to include diesel-fueled generators in its new power plant.

The facility includes an underground tank containing 10,000 gallons of diesel-fuel, enough to run the two diesel generators for 50 hours each. Gaseous-fueled generators will continue to provide the bulk of HL&P's capacity, in part to protect the local environment. Air quality is a major concern in the Salt Lake City region, both because the city rests in a mountain basin in which pollutants can linger, and because many households rely at least in part on wood-burning stoves for heat. The Utah Bureau of Air Quality monitors air emissions carefully. HL&P's generator sets, for example, must have their emissions tested once a year. However, HL&P already meets air-quality standards that will go into effect in 1995.

Under the utility's air permit, each G399TA gas-fired generator may operate for 3,400 hours per year, each G3516 gas unit for 4,400 hours, and each 3516 diesel unit for 900 hours. This is more than enough running time to meet the community's needs for the foreseeable future.

HL&P's long-term power contracts and ample generating capacity create a stable base on which to plan still further ahead. Four years' experience proves that HL&P staff can operate and manage generation equipment cost-effectively. Therefore, tentative plans are to add more generating capacity.

Assuming population growth continues, HL&P may build another generating plant on a site already under consideration, five miles outside the city limits. Depending on market prices for power, future gas-fired generators may help carry base loads.

This arrangement offers the advantages of guaranteed supply and predictable cost.

This is important at a time when utilities are finding it difficult to site and build large-scale facilities. Increasingly, new power plants and transmission lines face strong public opposition and long, difficult regulatory processes before construction can begin.

It is prudent to assume these obstacles will affect the supply and cost of power in years to come. While HL&P will always purchase the vast majority of its power from outside sources, Heber City residents can take comfort in having their own local power supply.

The generator sets insulate ratepayers from sharp increases in the market price of electricity, while providing power to see the community through emergencies, whether man-made or natural. PP

Ray Farrell is manager of Heber Light & Power in Heber City, Utah.

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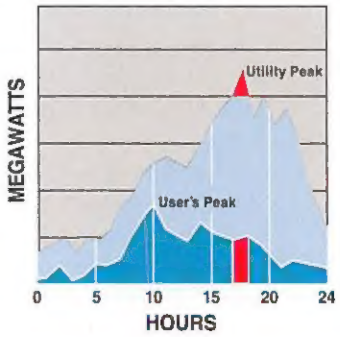

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